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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,290	10/27/2003	Bernhard Ulrich Koelle	10031055-1	2768

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EXAMINER

NGUYEN, PHILLIP

ART UNIT	PAPER NUMBER
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2828

DATE MAILED: 06/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/694,290

Applicant(s)

KOELLE ET AL.

Examiner

Phillip Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13-20 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-11 and 13-20 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8, 10-11, and 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ackley et al. ('596) in view of Hu et al. ('040).

With respect to claim 1, Ackley discloses in Fig. 1-3 a vertical cavity surface emitting laser (VCSEL) "operable" to generate single-mode laser light at an operative wavelength, comprising a light-emitting surface (top-center surface of the VCSEL); and a monolithic longitudinal stack structure including a first mirror 14/54 having an optical reflectivity R1 for light at the operative wavelength, a second mirror 18/58 having an optical reflectivity R2 for light at the operative wavelength, a cavity region disposed between the first mirror and the second mirror and including an active light generation region 16/56 and a cavity extension region (spacer) wherein the longitudinal stack structure further includes an ion-implanted current

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confinement region 27/57. However, the claimed invention requires the ion implanted current confinement region is separated from the cavity region by a longitudinal distance greater than 0.5 μm . Hu discloses the claimed invention in Fig. 8 and further a longitudinal distance 895 being from 0.2 to 0.5 μm . According to the MPEP 2131.03, since the range does not overlap between being equal 0.5 μm and greater than 0.5 μm , it is still believed that the difference is negligible and the output will be the same. In this case, assuming that the claimed distance is just slightly greater than 0.5 μm , for example, 0.50000000000000000001 μm , the power consumption and the output power or output wavelength will be essentially the same as it is 0.5 μm . Although both Hu and Ackley do not explicitly disclose the reflectivity of the first and second mirrors, it is believed that first and second mirror in VCSEL with reflectivity greater than 99.9% and less than 99.7% for bottom and top mirrors are well known in the art with the bottom mirror having greater reflectivity than that of the upper mirror so that light can escape to the emitting surface while a portion of light will be reflected back and oscillate within the laser cavity. To change the reflectivity of the mirror, more pairs of DBR will be added. For the improvement of the laser device, it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide the longitudinal distance as taught by Hu to Ackley in order to avoid the implantation damage to the active region (col. 15, lines 50-54).

With respect to claim 2, Hu discloses the metal contact 105 disposed on the light emitting surface and defining an aperture wherein the ion-implanted current confinement region 860 defined a current aperture larger than that of the metal contact (see the Figure).

With respect to claims 4-6, Hu discloses does not explicitly disclose the thickness of the layer 844 (which is considered as cavity extension region) being equal to the thickness of the

implanted region (col. 15, lines 54-59). However, Hu discloses the thickness (depth) of the implanted region being between 0.2 –2 μm . Therefore the thickness of the cavity extension is less than about twenty times of the operative wavelength and greater twice the operative wavelength (see col. 18, lines 1-14 for operative wavelength). Hu further discloses DBR includes alternating layers of different refractive index materials each having a longitudinal optical thickness substantially equal to one-quarter of the operative wavelength (col. 7, lines 32-36).

With respect to claim 7, Ackley discloses the cavity extension region (spacers) being next to first and second mirror.

With respect to claim 8, configuring the longitudinal thickness of the cavity extension region substantially to an integral multiple of one half of the operative wavelength which equals to the even or odd number of wavelengths only involves routine skill in the art.

With respect to claims 10-11, Ackley discloses the cavity extension region (upper spacer) between the active region (16) and the second mirror. Ackley further discloses the first portion (bottom spacer) of the cavity extension region being adjacent to the first mirror (14) and second portion (upper spacer) of the cavity extension region being adjacent to the second mirror (18).

With respect to claim 13, Hu discloses the current confinement region 860 defining a current aperture with a diameter of less than 12 micrometers (co. 16, lines 19-24).

With respect to claim 14, Ackley discloses the claimed laser could be arranged in the array (col. 4, lines 58-62).

With respect to claims 15-20, since Ackley and Hu combined disclose the product, it is inherent product by process for performing the method as recited in the claims.

3. Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ackley ('752) in view of Hu et al. ('040).

With respect to claim 1, Ackley discloses the claimed invention in Fig. 3 with the first mirror 20, second mirror 60, active region 40, implanted region 65, and cavity extension region 30 and 50. As discussed in the previous rejections of claim 1, it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide longitudinal distance greater than 0.5 μm from the implanted region to the cavity end as taught by Hu.

With respect to claim 9, Ackley further discloses the cavity extension 50 being disposed adjacent to the second mirror 60 having the same material composition as one of the different refractive index materials in the second mirror stack (col. 3, lines 20-26).

Allowable Subject Matter

4. Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip Nguyen whose telephone number is 571-272-1947. The examiner can normally be reached on 9:00 AM - 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY, can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


JAMES
MENEFEЕ